Dimethyl fumarate

Cat. No.: HY-17363

CAS No.: 624-49-7

Molecular Formula: $C_6H_8O_4$

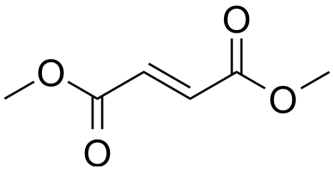
Molecular Weight: 144.13

Target: Keap1-Nrf2; Endogenous Metabolite; Reactive Oxygen Species; HIV; Autophagy

Pathway: NF-κB; Metabolic Enzyme/Protease; Immunology/Inflammation; Anti-infection; Autophagy

Storage:

Powder	-20°C	3 years
	4°C	2 years
In solvent	-80°C	1 year
	-20°C	6 months



SOLVENT & SOLUBILITY

In Vitro

DMSO : 41.67 mg/mL (289.11 mM; Need ultrasonic)

Preparing Stock Solutions

Solvent / Mass / Concentration	1 mg	5 mg	10 mg
1 mM	6.9382 mL	34.6909 mL	69.3818 mL
5 mM	1.3876 mL	6.9382 mL	13.8764 mL
10 mM	0.6938 mL	3.4691 mL	6.9382 mL

Please refer to the solubility information to select the appropriate solvent.

In Vivo

1. Add each solvent one by one: 50% PEG300 >> 50% saline
   Solubility: 7.5 mg/mL (52.04 mM); Suspended solution; Need ultrasonic
2. Add each solvent one by one: 10% DMSO >> 40% PEG300 >> 5% Tween-80 >> 45% saline
   Solubility: ≥ 2.08 mg/mL (14.43 mM); Clear solution
3. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)
   Solubility: ≥ 2.08 mg/mL (14.43 mM); Clear solution
4. Add each solvent one by one: 10% DMSO >> 90% corn oil
   Solubility: ≥ 2.08 mg/mL (14.43 mM); Clear solution
5. Add each solvent one by one: PBS
   Solubility: 2 mg/mL (13.88 mM); Clear solution; Need ultrasonic and warming and heat to 60°C

BIOLOGICAL ACTIVITY

Description

Dimethyl fumarate (DMF) is an orally active and brain-penetrant Nrf2 activator and induces upregulation of antioxidant gene expression. Dimethyl fumarate induces necroptosis in colon cancer cells through GSH depletion/ROS increase/MAPKs

activation pathway, and also induces cell autophagy. Dimethyl fumarate can be used for multiple sclerosis research[1][2].

In Vitro

Dimethyl fumarate (DMF; 20-200 μM; 24 hours) treatment dose-dependently reduces the viability of SGC-7901, HT29, HCT116 and CT26 cancer cells[1].
Dimethyl fumarate (DMF; 100 μM; 3-24 hours) significantly activates JNK, p38 and ERK in CT26 cells[1].
Dimethyl fumarate induces necroptosis in colon cancer cells and the mechanism involves GSH depletion, an increase in ROS and activation of MAPKs-mediated signalling[1].
Dimethyl fumarate inhibits dendritic cell (DC) maturation by reducing inflammatory cytokine production (IL-12 and IL-6) and the expression of MHC class II, CD80, and CD86. Dimethyl fumarate impairs NF-κB signaling via reduced p65 nuclear translocalization and phosphorylation. Dimethyl fumarate inhibits maturation of DCs and subsequently Th1 and Th17 cell differentiation by suppression of both NF-κB and ERK1/2-MSK1 signaling[2].
Dimethyl fumarate (DMF), an immune modulator and inducer of the antioxidant response, suppresses HIV replication and neurotoxin release[3].
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Cell Viability Assay[1]

Cell Line:	SGC-7901, HT29, HCT116 and CT26 cells
Concentration:	20 μM, 50 μM, 100 μM, 200 μM
Incubation Time:	24 hours
Result:	Reduced cell viability in SGC-7901, HT29, HCT116 and CT26 cancer cells.

Western Blot Analysis[1]

Cell Line:	CT26 cancer cells
Concentration:	100 μM
Incubation Time:	3 hours, 6 hours, 12 hours, 24 hours
Result:	Significantly activated JNK, p38 and ERK in CT26 cells after treatment from 3 to 24 h.

In Vivo

Dimethyl fumarate (DMF; 50 mg/kg; oral gavage; daily; for 7 days) treatment is shown to upregulate the mRNA and protein levels of Nrf2 and Nrf2-regulated cytoprotective genes, attenuate 6-OHDA induced striatal oxidative stress and inflammation in C57BL/6 mice[4].
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Animal Model:	Male C57BL/6 mice (8-week-old)[4]
Dosage:	50 mg/kg
Administration:	Oral gavage; daily; for 7 days
Result:	Was shown to upregulate mRNA and protein levels of Nrf2 and Nrf2-regulated cytoprotective genes.

CUSTOMER VALIDATION

- Nature. 2023 Mar;615(7952):490-498.
- Redox Biol. 2023 Oct 18, 102938.

- Pharmacol Res. 2023 Feb 14;106697.
- Cell Death Dis. 2024 Mar 18;15(3):224.
- Cell Death Dis. 2020 Jun 15;11(6):459.

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REFERENCES

[1]. Peng H, et al. Dimethyl fumarate inhibits dendritic cell maturation via nuclear factor κB (NF-κB) and extracellular signal-regulated kinase 1 and 2 (ERK1/2) and mitogen stress-activated kinase 1 (MSK1) signaling. J Biol Chem. 2012 Aug 10;287(33):28017-26.

[2]. Cross SA, et al. Dimethyl fumarate, an immune modulator and inducer of the antioxidant response, suppresses HIV replication and macrophage-mediated neurotoxicity: a novel candidate for HIV neuroprotection. J Immunol. 2011 Nov 15;187(10):5015-25.

[3]. Jing X, et al. Dimethyl fumarate attenuates 6-OHDA-induced neurotoxicity in SH-SY5Y cells and in animal model of Parkinson's disease by enhancing Nrf2 activity. Neuroscience. 2015 Feb 12;286:131-40

[4]. Xin Xie, et al. Dimethyl fumarate induces necroptosis in colon cancer cells through GSH depletion/ROS increase/MAPKs activation pathway. Br J Pharmacol. 2015 Aug;172(15):3929-43.

Caution: Product has not been fully validated for medical applications. For research use only.

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